

THE CICADELLIDÆ (JASSOIDEA-FAM. HOMOPTERA) OF WISCONSIN, WITH DESCRIPTION OF NEW SPECIES.

(With Two Plates).

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Interesting facts are always brought forth, when comparisons are made of faunal groups of several states. The insect fauna of Wisconsin has received but little attention in the past, because of a lack of entomological work of any considerable range in that state. For this reason it was not surprising that thirteen distinct species new to science were found in the limited group formerly known as the superfamily Jassoidea, but lately changed by Mr. E. P. Van Duzee in his list* to Cicadellidæ.

The Cicadellid faunas of four states east of the Mississippi river have been fairly well determined, viz.: Maine, New York, Tennessee and Wisconsin, and the following table shows at a glance the relative abundance of species of several genera in these regions.

	WIS.	MAINE	N. Y.	TENN.
Cicadellinæ.....	20	12	21	27
Bythoscopinæ.....	26	27	31	13
Deltocephalus.....	26	15	14	25
Euscelis.....	14	12	11	7
Phelpsius.....	14	9	10	19
Thamnotettix.....	17	16	12	11
Chlorotettix.....	6	4	6	15

The collection of material in this group has been carried on since 1910 by the senior author, but the larger part of the material was collected during the summer of 1916 by both authors, while traveling over the state in nursery inspection

*Check List of Hemiptera of Amer. N. of Mexico, New York Ent. Soc., 1916.

work. The list as determined numbers 206 species and varieties, representing 38 genera, and is second in number of species to the Tennessee list containing 212 species, which was published last year by the junior author.

In Maine, a state with a similar location and having a flora similar to that of Wisconsin, it is interesting to note that of 151 species collected by Professor Herbert Osborn, only 33 species of that list were not taken in Wisconsin, while 108 were found there. In the Tennessee list we find 99 species occurring which have not been taken in Wisconsin, while 113 species are common to both states.

The Wisconsin list has extended the known range of a number of species which were supposed to be restricted to more southern areas. The southern fauna seems to extend up the Mississippi River Valley as far north as St. Paul, and apparently works northward through the deep valleys adjoining this valley. As an instance, *Deltocephalus vinnulus* Crumb, described from Tennessee a year ago, was found in central Wisconsin, while *Acinopterus acuminatus*, a typical southern form, was found well up in Wisconsin, although it is rarely found north of the Ohio River.

The northern portion of Wisconsin, which produces many Canadian forms of vegetation, and is dotted with many lakes and swamps, contains a rather limited number of peculiar species found only under such conditions.

The best collecting for the species of this group is in localities where the vegetation is in its most primitive condition—not having been disturbed by farm practices or any form of cultivation, and in the absence of forest or prairie fires. From these facts we can readily observe that usual farm practices of cultivation and rotation of crops, as well as the burning-over of infested land, are factors in checking the multiplication of these species and their resulting damage to crops.

Leaf hoppers are more or less restricted to certain food plants, although some species seem to have but slight preference. In order to carry on satisfactory economic controls it is necessary to know where and under what conditions these forms occur naturally, and to determine their habits, including egg deposition, the methods of feeding and the form in which the species hibernates.

In the collection of leaf hoppers some interesting points have been determined, including the fact that when the temperature is very high in midsummer at midday, these forms seem to retire to the base of the plant, and are collected with difficulty, but earlier or later in the day they may be found in abundance on the same forms of vegetation. It is, therefore, advisable in collecting in midday to take advantage of open woodlands, or such conditions where the vegetation affords a reasonable amount of protection from the sun. Cloudy days are always advantageous for general collecting for these reasons. Some species, however, always feed very close to the ground, and can, therefore, be taken only by intensive sweeping close to the base of the plant.

It is to be hoped that these interesting forms will be collected more generally in the several states, than they have in the past, and that our economic entomologists will realize more fully the extent of damage which is caused by the millions of tiny sucking individuals occurring frequently in a few acres of pasture.

This list of species is numbered according to the "Check List of Hemiptera," prepared by Mr. E. P. Van Duzee, and published by the New York Entomological Society, 1916. The writers desire to express their appreciation of the kindly assistance and suggestions of Professor Herbert Osborn, in the preparation of this list, and also for the privilege of comparing the specimens with Professor Osborn's valuable collection. We wish also to express our appreciation to Mr. Joseph Knull, Harrisburg, Pa., for assisting in the preparation of the drawings.

Family—CICADELLIDÆ (Latr.) 1825.

Subfamily—BYTHOSCOPINÆ (Dohrn.)

- 1762. *Agallia novella* (Say)—Generally distributed.
- 1764. *A. 4-punctata* (Prov.)—Common.
- 1767. *A. sanguinolenta* (Prov.)—Common.
- 1777. *Idiocerus nervatus* VD.
- 1778. *I. pallidus* Fh.
- 1779. *I. suturalis* Fh. A fairly common species.
- 1779a. *I. suturalis* var *lunaris* Ball.
- 1781. *I. alternatus* Fh.
- 1782. *I. verticis* (Say).
- 1795. *I. lachrymalis* Fh.

Idiocerus subnitens n. sp.

(Figs. 1, 2, 3.)

Resembling *I. lachrymalis* in shape, slightly smaller and shiny, with a distinct brown median transverse band. Length 6 mm.

Vertex broad and very short; longer next eye than at middle, anterior margin slightly produced. Pronotum two and one-half times as wide as long; humeral angles broadly rounded and posterior margin slightly excavated. Elytra rather long, greatly overlapping at apex and well rounded; venation strong. Face broad, front almost as broad as long, margins angled at antennæ, gradually and evenly narrowed to clypeus. Loræ long, outer margins slightly rounded. Antennal pits unusually deep.

Color: Vertex pale yellow; two round spots in pits, a broad band just beneath with a spot extending back next either eye, and two extending back and diverging on the margin, black. A transverse row of four rather large white spots include the antennæ. Front, upper half pale; lower portion, clypeus and inner portions of loræ, dark brown. Pronotum pale, irregularly marked with dark brown forming four rather distinct blotches, one in either humeral angle and one either side of middle on the disc. Scutellum yellow, basal angles, two round spots on disc and a median line between them dividing just back of middle and extending to apex, dark brown. Elytra dark brown, iridescent; inner margin of clavus, and a transverse band just back of clavus milky white, subhyaline, apex smoky hyaline. Beneath light brown.

Genitalia: Female last ventral segment almost twice as long as preceding; rather evenly rounded from base to produced apex. Pygo-fers broad and stout, much exceeded by ovipositor.

Described from one female specimen swept from poplar at Tomah, Wis., August 2, 1916. This mature specimen differed so considerably from any known species by several well marked characters that it was thought advisable to describe it specifically.

- 1797. *I. snowi* G. & B.
- 1800. *I. cratægi* VD.—One specimen St. Croix Falls, Aug. 16, 1916.
- 1801. *I. provancheri* VD.
- 1807. *Macropsis gleditschiæ* (O. & B.)—Madison, Milwaukee.
- 1808a. *M. virescens* var *graminea* (Fabr.)—Southern part of state.
- 1809. *M. viridis* (Fh.).
- 1810. *M. occidentalis* VD.—Southern part of state.
- 1815. *M. basalis* (VD.)—Southern area.
- 1818. *M. bifasciata* (VD.)—Southern.
- 1824. *Oncopsis variabilis* (Fh.).
- 1825. *O. sobrius* (Walk)—Southern points.
- 1828. *O. fitchi* VD.—Southwestern points.

1829. *O. pruni* (Prov.)—One spec., Pembine, June 21, 1913.
 1831. *O. nigrinasi* (Fh.)—One spec., St. Croix Falls, Aug. 15, 1916.
 1832. *O. fagi* (Fh.)—Southern.
 1833. *O. distinctus* (VD.)—Southern.

Subf. CICADELLINÆ VD.

1847. *Oncometopia lateralis* (Fabr.)—General.
 1847a. *O. lateralis* var. *limbata* (Say)—St. Croix Falls, Aug. 16, 1916.
 1854. *Cicadella hieroglyphica* (Say.)—Gay's Mills, June 29, 1916.
 1855. *C. gothica* (Sign.)—Abundant throughout state.
 1859. *Kolla bifida* (Say.)—Sparingly in western areas of state.
 1863. *Helochara communis* Fh.—Generally distributed.
 1864. *Graphocephala coccinea* (Forst.)—Common.
 1873. *Draeculacephala angulifera* (Walk.)
 1874. *D. mollipes* (Say.)—Common.
 1875. *D. minor* (Walk.)—Common.
 1879. *D. noveboracensis* (Fh.)
 1884. *Eucanthus acuminatus* (Fabr.)—St. Croix Falls, Aug. 15, 1916.
 In damp undergrowth.

Subf. GYPONINÆ.

1894. *Penthimia americana* Fh.—3 spec. Lk. Geneva, Grand Rapids, Tomah.
 1896. *Gypona rugosa* Spangb.—3 specimens, Merrilan.
 1897. *G. 8-lineata* (Say.)—Generally distributed.
 1898. *G. cana* Burm.
 1904. *G. striata* Burm.—4 spec. Camp Douglass, Sturgeon Bay; Taylors Falls, Minn.
 1910. *G. bipunctulata* Woodw.—One specimen, Colfax, Aug. 9, 1916.
 1917. *G. pectoralis* Spangh.—2 spec., Blue River, Lk. Geneva.
 1923. *G. scarlatina* Fh.—3 spec., Madison, Camp Douglas.

Subf. JASSINÆ.

1936. *Acucephalus albifrons* (Linn.)—Two spec., Monroe, July 25, 1916.
 1940. *Xestocephalus pulicarius* VD.—General.
 1941. *X. superbus* (Prov.)—Central and northern.
 1943. *X. coronatus* O. & B.—2 spec., Amery, Aug. 11, 1916; Woodruff, Sept. 8, 1916.
 1956. *Parabolocratus major* Osb.—General.
 1957. *P. flavidus* Sign.—Two specimens, Madison, July 9, 1916.
 1972. *Mesamia nigradorsum* Ball.—One spec., Grand Rapids, Aug. 21, 1916.
 1975. *M. vitellina* (Fh.)—A northern species.
 1983. *Scaphoideus auronitens* Prov.—General.
 1984. *S. jucundus* Uhl.—Northern.
 1988. *S. scalaris* VD.—Fairly common.
 1989. *S. lobatus* VD.—Three spec., Woodman, July 27, 1916; Marshfield, Aug. 20, 1916.

1990. *S. ochraceus* Osb.—Three spec., Woodman, July 27, 1916; Amery, Aug. 10, 1916.
 1991. *S. productus* Osb.—Generally northern.
 1994. *S. intricatus* Uhl.
 1996. *S. immistus* (Say).—Common.
 1996. *S. immistus* var. *minor* Osb.—Common.
 2014. *Platymetopius acutus* (Say).
 2014a. *P. acutus* var. *dubius* VD.—Sixteen specimens, Ladysmith, Aug. 9, 1916.
 2017. *P. cuprescens* Osb.—Northern.
 2019. *P. cinereus* O. & B.—Madison & Woodman (July, Aug.).
 2020. *P. augustatus* Osb.—Two spec., Camp Douglas, Aug. 1, 1916.
 2023. *P. frontalis* VD.—Common at southern points.
 2029. *P. magdalensis* Prov.
 2033. *Deltocephalus bilineatus* G. & B.—Amery, Aug. 13, 1916; Marshfield, Aug. 20, 1916.

Deltocephalus luteocephalus n. sp.

(Figs. 19, 20, 21, 22.)

This beautiful species is readily distinguished by the ivory yellow head and orange red ocelli; elytra and general coloration resembling *D. bilineatus*. Length 3.5–4 mm.

Vertex convexly produced, pointed, twice as long in middle as next the eye, slightly wider than long. Pronotum equal to vertex in length, humeral angles evenly rounded to the almost truncate posterior margin. Elytra long and rather narrow, apex evenly rounded; nervures distinct. Face rather broad; front convex, evenly narrowed to the clypeus which is broader at apex than base. Antennal pits deep.

Color: Vertex white to ivory yellow; ocelli orange red and a median black suture on basal two thirds. Anterior margin of pronotum ivory white, darker posteriorly. Scutellum yellow. Face immaculate, ivory yellow, antennal pits black. Elytra smoky subhyaline; claval, discal and apical cells darker. Costal and apical cells darker brown distally. Nervures white margined with brown. Beneath pale.

Genitalia: *Female* last ventral segment rather long, broadly and slightly emarginate, with a shallow rounded notch at middle between two black spots. Pygofer beset with long brown hairs at apex. *Male* valve very short, broadly rounded. Plates large, convexly narrowed to bluntly rounded apices, each with a large brown spot near tip. Pygofer densely clothed with brown hairs.

A pair from Madison, (Lake Wingra), July 1, 1916.

2034. *D. imputans* O. & B.—Grand Rapids, Aug. 21, 1916.
 2039. *D. inflatus* O. & B.—Tomah and Grand Rapids (Aug.).
 2044. *D. reflexus* O. & B.—Grand Rapids and Taylors Falls, Minn., (Aug.)
 2045. *D. pectinatus* O. & B.—One spec., Madison, July 9, 1916.

2048. **D. abbreviatus** O. & B.—Two spec., St. Croix Falls, Aug. 16, 1916; Grand Rapids, Aug. 21, 1916.
2049. **D. stylatus** Ball.—One spec., Grand Rapids, Aug. 21, 1916.
2051. **D. configuratus** Uhl.—One spec., Pembine, Sept., 4, 1916.
2053. **D. sayii** (Fh.)—Common. July and August.
2054. **D. missellus** Ball.—Common.
2055. **D. weedi** VD.—One specimen, Blue River, July 28, 1916.
2059. **D. compactus** O. & B.—Not common, generally distributed.

***Deltocephalus nigriventer* n. sp.**

(Figs. 23, 24, 25, 26).

Resembles *D. compactus* in size and form, but with unique genitalia. 2.50–2.75 mm. long.

Vertex obtusely angled, two thirds as long as width between the eyes. Pronotum slightly longer than vertex, anterior margin strongly convex to humeral angles, truncated posteriorly. Elytra short and broad, exceeding the abdomen; venation indistinct. Face broad, convexly rounded to a quadrangular clypeus; loræ semi-circular.

Color: Two apical spots just anterior to a broad sinuate band, interrupted at middle, connecting the eyes, and ocelli, black. Pronotum milky gray, anterior half vaguely mottled with brown. Scutellum with basal angles and median stripe black. Elytra milky gray, subhyaline; clavus irregularly mottled with brown; a large spot each on discal cell, third anteapical cell and midway on costal margin, black. Nervures milky white. Face black with several pairs of pale lateral arcs. Clypeus with median black stripe forming a spot at apex; loræ margined with black. Venter black, segments pale margined.

Genitalia: *Female* last ventral segment twice as long as preceding, produced, broadly truncate, incised nearly to base; margins of incision almost overlapping, roundly angled. Ovipositors and pygofer almost overlapping, roundly angled. Ovipositors and pygofer dull black, the latter beset with many short paler bristles posteriorly. *Male* valve scarcely longer than preceding segment, obtusely pointed. Plates large, broadly convex, tapering to rounded, upturned points; margin and dorsal surface with pale hairs.

Six females and two males from Merrillan, August 5, 1916, and one female from Tomah, August 2, 1916, were swept from small grasses. The female genitalia are decidedly unique for the genus.

2060. **D. vinnulus** Crumb.—Four specimens, Grand Rapids, Aug. 21, 1916. These specimens agree exactly with cotypes from Tennessee.
2062. **D. apicatus** Osb.—One specimen Merrillan Jt., Aug. 5, 1916.
2063. **D. inimicus** (Say)—Generally distributed.

***Deltocephalus fumidus* n. sp.**

(Figs. 11, 12, 13, 14).

Uniform smoky brown iridescent, with black ocelli. Length 4.5 to 5 mm.

Vertex similar to *D. inimicus*, about as long as width between the eyes, flat. Pronotum twice as wide as long, and one-half longer than vertex, strongly convex anteriorly; humeral angles sloping sharply to truncate posterior margin. Elytra long, strongly curved on costal margin, rounded at apex. Front convex, triangular, evenly narrowed to the rectangular clypeus. Loræ small, narrow and distant from margin.

Color: Vertex pale, shading to smoky brown at apex; ocelli conspicuously black, encircled with white. Pronotum, scutellum and elytra vitreous pale brown. Nervures paler, narrowly margined with brown. Face smoky shading to lighter on clypeus and genae. Abdomen above black, beneath pale grey.

Genitalia: *Female* last ventral segment longer than preceding; posterior margin truncated and slightly sinuated and infuscated either side or middle. Ovipositor black, pygofers long and thickly clothed with dark hairs on apical third. *Male* valve short, triangular, inserted in the concavity of preceding segment; plates long, broad at base, and concavely narrowed to pointed apices. A single row of hairs on outer margin. Base of each plate with a median brown spot. Pygofers densely clothed with brown hairs.

One female and thirteen males at Woodman, July 27, 1916.

2071. *D. debilis* Uhl.—One specimen, Colfax, Aug. 9, 1916.

2075. *D. melsheimerii* Fh.—Common in northern localities.

2079. *D. affinis* G. & B.—Common.

***Deltocephalus concinnus* n. sp.**

(Figs. 4, 5, 6).

Form and size of *D. affinis*, with two parallel brownish stripes on vertex, pronotum and scutellum. Length 3.25–3.50 mm.

Vertex flat, as long as wide, bluntly angled. Pronotum equaling vertex in length, strongly convex to the broadly rounded humeral angles, posterior margin truncate. Elytra rather long, just exceeding abdomen, tips broadly rounded and slightly flaring. Face about as broad as long, sutures of front and clypeus forming a straight line.

Color: Testaceous; ocelli black; vertex, pronotum and scutellum with two broad parallel brownish stripes; pronotum with an additional stripe behind either eye. Nervures white. Abdomen pale orange above. Venter yellow. Face dusky; a median line and traces of several pairs of arcs, dull yellow.

Genitalia: *Female* last ventral segment slightly longer than preceding; almost truncate with median brown spot. Pygofer robust; posterior two thirds with many pale hairs.

Two females collected at Ladysmith, August 9, 1916.

2081. *D. oculus* O. & B.—General in northwestern localities.
2083. *D. sylvestris* O. & B.—Generally distributed.
2090. *D. osborni* VD.—Rather generally distributed in central and northern areas.
2097. *D. balli* VD.—Madison, July 21, 1916; Amery, Aug. 14, 1916.
2126. *Driotura gammaroides* (VD).—One spec., Merrillan, Aug. 3, 1916.
2131. *Euscelis exitiosus* (Uhl.).—Southern portion of state.
2132. *E. striolus* (Fall.).—Generally distributed.
2133. *E. parallelus* (VD.).—Generally distributed.
2134. *E. extrusus* (VD.).—Lake Geneva, June 21, 1916; Pine Lake, July 16, 1916.
2138. *E. uhleri* (Ball).—One spec., St. Croix Falls, Aug. 16, 1916.
2142. *E. arctostaphyli* (Ball).—1 spec., Madison, July 22, 1916.
2143. *E. humidus* (Osb.).—In bog at Ladysmith, Aug. 9, 1916.
2144. *E. striatulus* (Fall.).—Pembine, Trout Lk., Amery (Aug. and Sept., 1916).
2145. *E. vaccini* (VD.).—Pembine, Merrillan, Amery (Aug. and Sept., 1916).
2146. *E. instabilis* (VD.).—Trout Lake, Aug. 6, 1913; Ladysmith, Aug. 9, 1916.

Euscelis deceptus n. sp.

(Figs. 40, 41, 42).

Coloration and general appearance of *D. osborni*, but lacking the venation of *Deltocephalus* and definite markings. Dull testaceous. Length 5.5–6 mm.

Vertex short and broad, rounding to front, almost twice as long on middle as next the eye; two and one-half times as broad as long. Width of pronotum more than twice the length; lateral margins distinct, humeral angles broadly rounded to shallow emargination posteriorly. Elytra broad, subhyaline, exceeding the abdomen in length; apices well rounded. Front equal in length and breadth, well rounded to the quadrangular clypeus.

Color: Vertex testaceous, with an indistinct brown transverse band, sometimes interrupted in middle, on center of disk. Ocelli bright red. Pronotum dull testaceous, with a row of four to six very indistinct spots just behind anterior margin. Scutellum with two discal spots and apical angle brownish. Elytra a dirty yellow, with intermediate brown markings. Venation usually indistinct. Venter pale bordered with brown. Face pale testaceous, several pairs of arcs on front, sutures, and margins of loræ, brown.

Genitalia: *Female* last ventral segment, twice as long as preceding, broadly excavated with a black spot and a small tooth at the middle. Lateral margins of segment and ovipositor black. Pygofer bright yellow, posterior half evenly clothed with brown hairs. *Male* valve narrow, triangular, apex rounded; plates short and broad, convexly rounding to blunt apex with a marginal row of hairs. Discs of valve and plates with a brown spot.

Females collected: One each, Milwaukee, July 18, 1916; Madison, July 1, 1916, and July 21, 1916; Chicago, Ill., June 24, 1910. Males: One at Chicago, June 24, 1910, and one short-winged male from Fryeburg, Me., September 5, 1913.

- 2148. *E. elongatus* (Osb.)—Milwaukee, Madison, Pembine (July).
- 2156. *E. curtisii* (Fh.)—General.
- 2160. *Eutettix luridus* (VD.)—Eleven spec., Trout Lake, Sept. 7, 1916.
- 2161. *E. marmoratus* VD.—Four specimens, St. Croix Falls, Aug. 16, 1916.
- 2163. *E. subaeneus* (VD.)—One specimen from Madison referred to this species.
- 2179. *E. seminudus* (Say).
- 2180. *E. cinctus* O. & B.—One spec., Grand Rapids, Aug. 21, 1916.
- 2181. *E. strobi* (Fh.)—One specimen, Milton Jct., Sept. 12, 1911.
- 2195. *Phlepsius majestus* O. & B.—One spec., Woodruff, Sept. 8, 1916.
- 2201. *Ph. decorus* O. & B.—Four spec., Grand Rapids, Aug. 21, 1916; Trout Lake, Sept. 7, 1916.
- 2204a. *Ph. cumulatus* var *arctostaphylae* Ball.—Abundant at Taylors Falls, Minn., just across the St. Croix river from St. Croix Falls, Wis., Aug. 16, 1916; from Partridge berry (*Michella repens*).
- 2221. *Ph. altus* O. & B.—One specimen, Woodman, July 27, 1916.
- 2223. *Ph. incisus* VD.—Three specimens, Blue River, July 28, 1916.

***Phlepsius umbrosus* n. sp.**

(Figs. 15, 16, 17, 18).

A dark brown robust species resembling *P. incisus* in form and size. Head scarcely narrower than pronotum. Length 6–6.5 mm.

Vertex obtusely angled, almost twice as long in middle as next the eye; breadth three times the length. Pronotum very strongly convex, twice the length of vertex, and two and a half times as wide as long. Elytra broad, well rounded at tips. Face slightly longer than broad; frontal sutures straight to clypeus, which is broadest at apex; loræ broad, evenly rounded and approximating the margin.

Color: Vertex evenly irrorate, with pale spot at the base next each eye; ocelli pale. Pronotum evenly irrorate and punctulate. Elytra milky white, rather densely and evenly inscribed with dark brown. Face dark brown, evenly irrorate with testaceous.

Genitalia: *Female* last ventral segment twice the preceding in length; lateral angles produced and sharply rounded to an arcuate posterior margin incised at middle, forming two produced broadly rounded lobes, margined by a large semicircular brown spot extending half way to the base. *Male* valve almost equaling last ventral segment in length, slightly concave to an obtuse point. Plates long, evenly narrowed to small blunt points; each outer margin with a few stout bristles.

One female and two males, Grand Rapids, August 21, 1916.

2228. *Ph. irroratus* (Say)—Common.

2230. *Ph. collitus* Ball.—Amery and Tomah, Aug. 13, 1916.

2234. *Ph. lobatus* Osb.—Grand Rapids, Aug. 21, 1916; Taylors Falls, Aug. 16, 1916.

2236. *Ph. apertus* VD.—Two specimens, Trout Lake, Aug. 6, 1913; Pembine, Sept. 4, 1916.

2237. *Ph. fulvidorsum* (Fh.)—One spec., St. Croix Falls, Aug. 15, 1916.

2246. *Ph. solidaginis* (Walk.)—Common in western central areas.

Phelpsius bifidus n. sp.

(Figs. 7, 8, 9, 10).

Resembling *P. solidaginis* in general appearance, but smaller and with distinct genitalia. Length 6–6.5 mm.

Vertex sharp margined, slightly produced and upturned; disc concave, almost twice as long on middle as next the eye; width between the eyes two and one half times the length. Pronotum almost twice as long as vertex, humeral angles well rounded, disc with coarse punctures. Elytra broad, well rounded and flaring at the tips. Face almost as broad as long; front concave below margin, strongly narrowed from antennal pits to clypeus.

Color: Vertex pale, rather heavily irrorate with brown; a spot on upturned apex and one near each eye at either side of base, pale. Narrow anterior margin of pronotum pale, posteriorly dark with light punctures. Elytra milky white, sparsely irrorate except on discal cell and apex of clavus. Veins, a dark spot on base of inner apical cell and four spots on costa, each one at termination of apical costal veins, brown. Face heavily irrorate with brown above, causing it to appear dark in color. Below showing traces of a median line and five pairs of pale arcs. Beneath dark brown, differing greatly from other species.

Genitalia: *Female* last ventral segment twice as long as preceding, strongly produced, angularly rounded to a deep "V" shaped incision, extending more than half way to base. Incision margined with brown. *Male* valve as long as preceding segment, obtusely triangular, plates three times as long as valve, broad and convex at base, then narrowing concavely to blunt points. Margins only beset with short heavy bristles and marked with black points.

Four specimens, two females from Trout Lake, August 6, 1913, and September 7, 1916, and two males from Amery, August 13, 1916, and Woodruff, September 8, 1916.

2247. *Ph. ramosus* (Baker).
2249. *Acinopterus acuminatus* VD.—One specimen from brake ferns(?) at Camp Douglas, Aug. 1, 1916.
2262. *Thamnotettix cockerelli* Ball.—One specimen, Woodruff in extreme northern portion of state, Sept. 8, 1916.
2263. *Th. morsei* Osb.—Three specimens, Trout Lake in northern part of state, Sept. 7, 1916.
2265. *Th. clitellarius* (Say).—Generally distributed.
2286. *Th. atridrosus* VD.—Six specimens from northern localities.
2292. *Th. chlamidatus* (Prov.)—Pembine, July 26, 1916.
2305. *Th. melanogaster* (Prov.)—Generally distributed.

Thamnotettix stramineus n. sp.

(Figs. 27, 28, 29, 30, 31.)

Bright shining straw yellow with two narrow black dashes on margin of vertex. Length 6.5–7 mm.

Vertex very bluntly angled, one-half as long as broad, and half longer in middle than next the eye. Pronotum one-half longer than the vertex, with humeral angles broadly rounded, posterior margin nearly truncate. Elytra one-third longer than the abdomen, clavus extending to tip of abdomen. Face broad, roundly convex and suddenly narrowed to the quadrangular clypeus.

Color: Vertex yellow, margin with two short transverse dashes and a point on either side, black. Anterior margin of pronotum with yellow band, remainder shiny greenish yellow or darker, scutellum dull yellow. Elytra greenish yellow, subhyaline, shiny; nervures yellow. Beneath yellow in female; black margined with yellow in male; legs yellow. Face yellow, lateral sutures and antennal pits sometimes black.

Genitalia: *Female* last ventral segment as long as preceding, strongly produced with broad, shallow posterior emargination; a black raised disk on each side, embossed with deep converging striae. These disks joined by a brown or black band in dumb-bell fashion. Pygofers pale with long yellow hairs on posterior two-thirds. Ovipositor slightly darker. *Male* valve large and strongly convex, apex broadly rounded; plates as long as valve, divergent, convexly produced to a sharp black point; pygofers long, black at extreme tips and bearing an unusual number of long white hairs.

Specimens collected as follows: Ladysmith, Aug. 9, 1916, seven females and four males; Amery, Aug. 13, 1916, two females; Madison, July 22, 1916, one female and two males; Blair, Aug. 8, 1916, one female; Marshfield, Aug. 20, 1916, six females.

2306. *Th. ciliatus* Osb.—At Madison on sedges, Aug. 30, 1916.
2307. *Th. decipiens* Prov.—In extreme north of state on sedges.
2308. *Th. smithi* VD.—General.
2312. *Th. fitchii* VD.—Common.
2314. *Th. nigrifrons* (Forbes).—Common in southern part of state.
2318. *Th. inornatus* VD.—Northern localities on wild rye.

***Thamnotettix mellus* n. sp.**

(Figs. 46, 47, 48, 49.)

A small, shiny, yellow, unmarked species, 4.5–5 mm. in length.

Vertex short, obtusely angled, less than one-half longer on middle than next the eye, and nearly twice as long as broad. Pronotum nearly twice as long as vertex, humeral angles broadly rounded, and posterior margin nearly truncate. Elytra relatively long, much exceeding abdomen. Nervures distinct. Face short, broad and suddenly narrowed to the clypeus which is broadened and well rounded at the apex.

Genitalia: *Female* last ventral segment long, lateral angles broadly concave emargination enclosed by a lunular brown area. Ovipositor and pygofer long, the latter with many long pale hairs on posterior two-thirds. *Male* valve very short, evenly rounded, one-half length of previous segment; plates long triangular, gradually tapered to blunt points, outer margin clothed with pale hairs.

Color: Vertex and face smoky yellow, unmarked. Anterior margin of pronotum and scutellum, pale yellow; posterior margin darker. Elytra dull pale yellow, clavus washed with brighter yellow. Venter and legs yellow; tarsal claws black.

A pair from Trout Lake, Vilas Co., August 6, 1913.

2319. *Th. placidus* Osb.—At northern points.
2320. *Th. cyperaceus* Osb.—General on sedges.

***Thamnotettix vittipennis* n. sp.**

(Figs. 36, 37, 38, 39.)

Resembling *Th. cyperaceus* in general appearance. Vertex more rounded and with black marginal line as in *Th. smithi*. Length 5.5–6 mm.

Vertex one-half longer on middle than next the eye, evenly rounded, half as long as width between the eyes. Front evenly rounded to clypeus which is widened and almost truncate at apex. Pronotum about one-half longer than vertex, slightly emarginate behind; humeral angles broadly rounded. Elytral nervures distinct.

Color: Vertex with broad tawny band covering disc and extending to eyes; posterior central portion pale with a median suture; ocelli red; stripe on margin connecting eyes black. Face light, sutural lines of front black. Pronotum tawny to testaceous, anterior margin lighter.

Elytra tawny, subhyaline, nervures white margined with brown, appearing striped. An indistinct brown band extends from humeral angles to the tips of elytra, interrupted by the pale nervures. Venter black, margined with yellow; ovipositor and tips of male plates black.

Genitalia: *Female* last ventral segment as long as preceding, longitudinally striated; posterior border slightly emarginate and narrowly notched either side of middle; pygofer long beset with long brownish bristles. *Male* valve broad, long, apex roundly angled. Plates short, broadly and convexly rounded, posterior half diverging to a black rugose blunt point. Posterior half beset with many long white bristles.

Four specimens, a pair from Trout Lake, Sept. 7, 1916, and two males from Ladysmith, Aug. 9, 1916, were swept from sedges in low swampy ground.

2324. *Chlorotettix unicolor* (Fh.)—Common and generally distributed.

2326. *Ch. spatulatus* O. & B.—In northwestern localities.

2327. *Ch. tergatus* (Fh.)—Throughout the State.

2331. *Ch. galbanatus* VD.—At northwestern points.

Chlorotettix borealis n. sp.

(Figs. 32, 33, 34, 35.)

Resembling *C. vividus* in shape, but slightly smaller and with distinct genitalia. Length 5 mm. Much smaller than any other known northern species.

Vertex obtusely angled, slightly more than one-half longer on the middle than next the eye, twice as broad as long. Anterior margin of pronotum strongly convex; posterior margin slightly concave; lateral angles broadly rounded. Elytra smoky hyaline.

Color: Resembling *C. vividus* in color, more of grass green than found in most species of the genus. Last ventral segment of female with a dark median stripe from the apex of the incision to the base of the segment. Ovipositor dark. Tibia and tarsi of front legs brownish.

Genitalia: *Female* last ventral segment twice as long as preceding, lateral angles well rounded. A rather broad median notch extending half way to the base; sides convexly angled posteriorly. *Male* valve twice as long, triangular with rounded apex. Plates rather long, convexly rounded to rather blunt tips. Hairs mostly on margin and dorsal surface.

A pair were swept from grass in a clearing at Trout Lake, Sept. 7, 1916.

2336. *Ch. lusorius* O. & B.—At central and northern points.

2340. *Jassus olitorius* Say.—Two specimens, Woodman, July 27, 1916; Tomah, Aug. 2, 1916.

2343. *Neocoelidia tumidifrons* G. & B.—One spec., Tomah, Aug. 2, 1916.

- 2356a. *Cicadula punctifrons* var. *repleta* Fieb.—Two specimens from Augusta, Aug. 4, 1916.
2358. *C. variata* (Fall.)—Common.
2359. *C. lepida* VD.—Common.
2362. *C. 6-notata* (Fall.)—Common.
2368. *C. slossoni* VD.—Merrillan & Tomah, Aug. 2, 1916.
2370. *Balclutha punctatus* (Thunbg.)—Common.
2371. *B. osborni* VD.—General.
2373. *B. impictus* (VD.)—General.
2377. *Eugnathodus abdominalis* (VD.)
2380. *Alebra albobstriella* (Fall.)—Southern points.
2384. *Dicraneura cruentata* Gill.—St. Croix Falls, Aug. 16, 1916.
2386. *D. mali* (Prov.)—Common.
2387. *D. abnormis* Walsh.—Two specimens, Blue River, July 28, 1916.
2393. *D. fieberi* (Loew.)—Common.
2395. *Empoasca smaragdula* (Fall.)—Three spec., Madison, Merrillan and Gay's Mills.
2396. *E. aureoviridis* (Uhl.)—Three spec., Madison, June 10, 1912; Greenwood, Aug. 19, 1916.
2397. *E. unicolor* Gill.—One specimen, La Crosse, Aug. 7, 1916.
2398. *E. obtusa* Walsh.
2401. *E. atrolabes* Gill.
2403. *E. denticula* Gill.—One spec., Pembine, July 26, 1910.
2416. *E. snowi* Gill.—Southern.
2421. *E. mali* (LeB.)—Common.
2422. *E. flavescens* (Fabr.)
2423. *E. viridescens* Walsh.—One spec., Amery, Aug. 11, 1916.
2424. *E. birdii* Goding—Three spec., Marshfield, Aug. 20, 1916; Amery, Aug. 16, 1916.
2428. *Typhlocyba nigra* (Osb.)—One spec., Amery, Aug. 14, 1916.
2429. *T. flavoscuta* (Gill.)—Common at Marshfield, Aug. 20, 1916, on ferns in dark woods. Also at Greenwood and Amery.
2430. *Empoa querci* Fh.—Common at Madison.
- 2430a. *E. querci* var. *bifasciata* (G. & B.)—Common.

***Empoa aureotecta* n. sp.**

(Figs. 43, 44, 45).

Size and form of *E. querci*; basal two thirds of elytra uniform orange yellow without pattern. Length 3.75 to 4 mm.

Head produced, scarcely angled, almost a third longer on the middle than next the eye. Pronotum twice as long as the vertex. Elytra rather long, nervures indistinct.

Color: Vertex pronotum and scutellum bright yellow unmarked. Elytra uniform orange yellow from base to tip of clavus, whitish hyaline beyond, apex faintly smoky. Face, legs and venter pale yellow. Pygofers and ovipositor bright yellow, the apex of the latter, black.

Genitalia: *Female* last ventral segment twice as long as preceding, much produced, gradually rounding from lateral angles to a keeled, blunt apex. Pygofers stout, a row of short hairs either side of ovipositor.

Three female specimens swept from oak at Madison, July 9, 1916.

- 2434. *E. commissuralis* (Stal.)
- 2435. *E. tenerima* (H. S.)—One spec., Bayfield (in extreme north), Sept. 10, 1916.
- 2437. *E. rosae* (Linn.)—Generally distributed.
- 2440. *Erythroneura trifasciata* (Say)—Generally distributed.
- 2441. *E. tricineta* Fh.—Madison and Lk. Geneva.
- 2443. *E. hartii* (Gill.)—Four specimens from Taylor's Falls, Aug. 16, 1916.
- 2445. *E. comes* (Say).—Common.
- 2445a. *E. comes* var. *vitifex* Fh.
- 2445b. *E. comes* var. *ziczac* Walsh.
- 2445c. *E. comes* var. *vitis* (Harr.)—Common.
- 2445d. *E. comes* var. *basilaris* (Say)—Amery, Aug. 11, 1916.
- 2445f. *E. comes* var. *rubra* Gill.
- 2445g. *E. comes* var. *maculata* Gill.—Madison.
- 2446. *E. illinoiensis* (Gill.)—Baraboo and Marshfield.
- 2447. *E. obliqua* (Say).
- 2447b. *E. obliqua* var. *noevus* (Gill.)—Lk. Geneva and Madison, June 21, 1916.
- 2447c. *E. obliqua* var. *fumida* (Gill.)—St. Croix Falls, Aug. 15, 1916.
- 2448. *E. vulnerata* Fh.
- 2448a. *E. vulnerata* var. *niger* (Gill.)—Amery, Aug. 11, 1916.

A total of 206 species and varieties, including 13 new species, are listed above. Additional species common to Iowa and Illinois should be found by collecting in the southwestern counties of Wisconsin near the Mississippi river.

EXPLANATION OF FIGURES.

The figures of the vertex and face of species illustrated have been drawn to the same scale, while the genitalia have been drawn to the same scale, although more highly magnified.

PLATE VIII.

- Idiocerus subnitens*..... Figs. 1, 2 and 3.
Deltocephalus luteocephalus.... Figs. 19, 20, 21 and 22.
Deltocephalus nigriventer..... Figs. 23, 24, 25 and 26.
Deltocephalus fumidus..... Figs. 11, 12, 13 and 14.
Deltocephalus concinnus..... Figs. 4, 5 and 6.
Euscelis deceptus..... Figs. 40, 41 and 42.
Phlepsius umbrosus..... Figs. 15, 16, 17 and 18.
Phlepsius bifidus..... Figs. 7, 8, 9 and 10.

PLATE IX.

- Thamnotettix stramineus*..... Figs. 27, 28, 29, 30 and 31.
Thamnotettix mellus..... Figs. 46, 47, 48 and 49.
Thamnotettix vittipennis..... Figs. 36, 37, 38 and 39.
Chlorotettix borealis..... Figs. 32, 33, 34 and 35.
Empoa aureotecta..... Figs. 43, 44 and 45.